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Studies on the Diversity of Aquatic Pteridophytes (Ferns and fern allies) in District Banswara of South Rajasthan, India

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Abstract

Pteridophytes are lower vascular plants with fascinating foliage show distinctly independent vascular sporophyte arising from embryos which are not enclosed within any seed structure. The group claims a special position as the first land plants forming forests. This study aimed to determine the diversity and distribution of aquatic Pteridophytes found in Banswara district (Wagad Region) of South Rajasthan, India. In the years 2016 and 2017, the specimens were collected from four forest sites, located from the north to the south of the study area. A total of Four species belonging to Three genera are reported.

Pteridophytes are lower vascular plants which show distinctly independent vascular sporophyte arising from embryos which are not enclosed within any seed structure. The group claims a special position as the first land plants forming forests. They have two quite distinct phases in life, a perennial, physiologically independent and dominating asexual stage (the Sporophyte) and a short lived but free living independent sexual stage (the Gametophyte or Prothallus). Both sporophyte and gametophyte are photosynthetic plants. The presence of vascular elements in pteridophytes makes their grouping with gymnosperms and angiosperms as Tracheophytes, and their reproduction by spores and similar events of life cycle place them among lower plants. They are represented by about 400 living and fossil genera and some 13000 species.

For the identification of the collected species, relevant literature[1-7] has been consulted.

Study Area :

The Banswara district falls in southern physiographic region of the state inhabited predominantly by scheduled tribes having very low socio-economic status. It has an area of 5,037 square kilometres (1,945 sq. miles) in between 23.11° N to 23.56° N latitudes and 73.58° E to 74.49° E longitudes. Banswara has plenty of rainfall and on the whole has a salubrious climate. Further, it has a highly varied physiography, from plateau lands to hilly tracts. Due to heavy rainfall (averaging around 1200 mm per annum) with plenty of humidity, it becomes good spot for the growth of Pteridophyte vegetation in Rajasthan.

Collection and Preservation :

The present study is based on the

specimens available at the P.G. Department of Botany, Shri Govinnd Guru Government College, Banswara, Rajasthan, earlier collected from various localities of district Banswara of South Rajasthan during the year 2016-17. An extensive and intensive field surveys were made by visiting various places of district Banswara in different seasons to collect aquatic Pteridophytes. All the specimens were labelled, numbered and properly processed and Herbarium were prepared for further study. The Herbarium were deposited in P.G. Department of Botany, Shri Govind Guru Governemnt College, Banswara (Rajasthan).

The present study resulted in the collection and identification of the following species :

***Marsilea minuta* L.** *Marsilea minuta* L., Mant: 308 (1771).

Rhizome long-creeping, thin, glabrous but apex hairy; hairs light-brown, 4-5 celled long. Stipe length variable, 2.0-15.0 cm, base faintly connate, greenish, thin, glabrous; pinnae 1-2 cm long, 0.5-1.5 cm broad, obcuneate, margin entire or toothed or crenate; veins many, anastomosing obliquely, glabrous. Sporocarps usually borne in pairs, sometimes many, free from the stipes and also from each other, basal, pedicellate, pedicels short and twice as long as the body of the sporocarp, glabrous; sporocarp body 0.3-0.6 cm long, 0.2-0.3 cm broad, bean-shaped, bilaterally compressed, distinctly ribbed, bordered and hairy; hairs light-brown, 3-4-celled, base truncate, apex rounded, horns 2, distinct but upper one usually larger. Megaspores 48-51 µm.

Field Notes : Plants found freely floating in marshy area and near water channels and water ponds.

Localities of Collection : Thikaria Tank, Govt.College Campus, Ransagar Tank, Sagwara, Kushalgarh, Baitalab Tank, Lohariya tank near Partapur Garhi, Tripura Sundari, Peepalkhunt-Hilage Forest Area.

Distribution : Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Kerala, Madhya Pradesh, Chennai, Maharashtra, Mysore, Orissa, Punjab, Uttar Pradesh, West Bengal, Rajasthan (Ajmer, Udaipur, Kota, Bharatpur, Ganganagar, Suratgarh, Pali, Bhilwara, Bikaner, Pilani, Mt. Abu); North America, Pacific Ocean Islands and East Indies.

***Marsilea rajasthanensis* var. *billardii* (Gupta) Gupta,** stat. nov.

The Plants are xerophytic and appear very different from the type species in their vegetative growth. The leaflets are deeply lobed and the sporocarps square and densely covered with hairs. The attachment of the pedicel to petiole is similar to the type species, but the inner contents of the sporocarps reveal sporangial aberrations. The megaspores are absent, hence this variety is with abnormal sporocarps but flourishing equally well in nature.

Field Notes : The plants grow on and near seasonal running water and ponds.

Localities of Collection : Singpura water fall, Kagdi pick up Bank, Peepalkhunt-Hilage Forest Area.

Distribution : Ajmer, Bhilwara, Udaipur, Jaipur and Kota.

***Salvinia auriculata* Roxb.** *Salvinia auriculata*

Roxb. Ex Bory, Bel Voy. Bot. 2 : 6, 1833.A

Common, small, tufted floating fern. These floating aquatics are commonly met with in ponds, lakes and quite abundant in the rainy season. They closely cover the water surfaces with quite often. Rhizome horizontal, 2-4 cm in diameter, covered with uniseriate, unbranched multi-cellular hair, with internodes 1-1.5 cm long, bearing 3 leaves at each node, two dorso-laterals and one ventral. Dorso-lateral leaves consist of two semi-orbicular halves which are jointed at the base giving an appendage of a bivalve, thick flashy, margins entire, dorsal surface is completely covered with dense mass of multicellular hairs which are branched digitately at the apex giving an appendage of a chaw, ventral surface is sparsely covered with short, unbranched, multicellular hairs; hairs are green in young leaves but turn brown in mature ones. The midrib is quite distinct at the base which gives out parallel anastomosing veins ultimately ending in the margin. Ventral leaf is dissected into 35 root like segments and 2-3 sporocarps bearing zigzag segments; the longest root like segments 25 cm long, with hairs 8 mm long. Sporocarp bearing segments with apocarps of which first 1-2 bears megasporangia with larger stalk and remaining micro-sporangia which have very short stalk. Both types of sporangia are ovate with a pointed apical region, densely covered with rusty-brown muticellular hairs. Megasoprangia bear only one spore at the maturity but microsporangia have numerous spores.

Field Notes : In slow moving water or still lakes, ponds or backwaters. Once introduced into a water body, rapid vegetative growth enables the plant to cover the most of the free water surface.

Localities of Collection : Salakeshwar valley.

Distribution : Chamba, Khajjiar lake, Uttar Pradesh, Bengal, Tripura, Maharasthra; Java.

***Azolla pinnata* R.Br.** *Azolla pinnata* R.Br., Prod. Fl. N. Holl. :167 (1810).

Stems up to 2.5 cm. long, thin, 0.02 cm diameter, main axis pseudodichotomously branched. Leaves in two rows, imbricate but widely spaced towards the base, 2- lobed, entire plant generally flat or slightly curled, upper or dorsal lobe non-imbricate in the part, slightly towards the distal part, up to 0.1 cm long, ovate or broadly elliptic, apex acute or subrounded, central region chlorophyllous, margin hyaline, irregular broad, comprising of 2-4 layers of radially elongated cells; ventral lobe colourless, ± as long as the dorsal lobe. Sporocarps on the submerged ventral lobes; microsporocarps either borne singly or subtended by the megasporocarp, spherical, up to 0.15 cm. diameter; megasporocarp larger with a single megaspore.

Field Notes : Free floating in ditches and ponds. Often water surface is completely covered because of vegetative multiplication. The floating mass looks reddish when growing vigorously.

Localities of Collection : Thikaria Tank, Baitalab Tank, Tripura Sundari, Peepalkhunt-Forest Area, Salakeshwar valley and Dailab Talab.

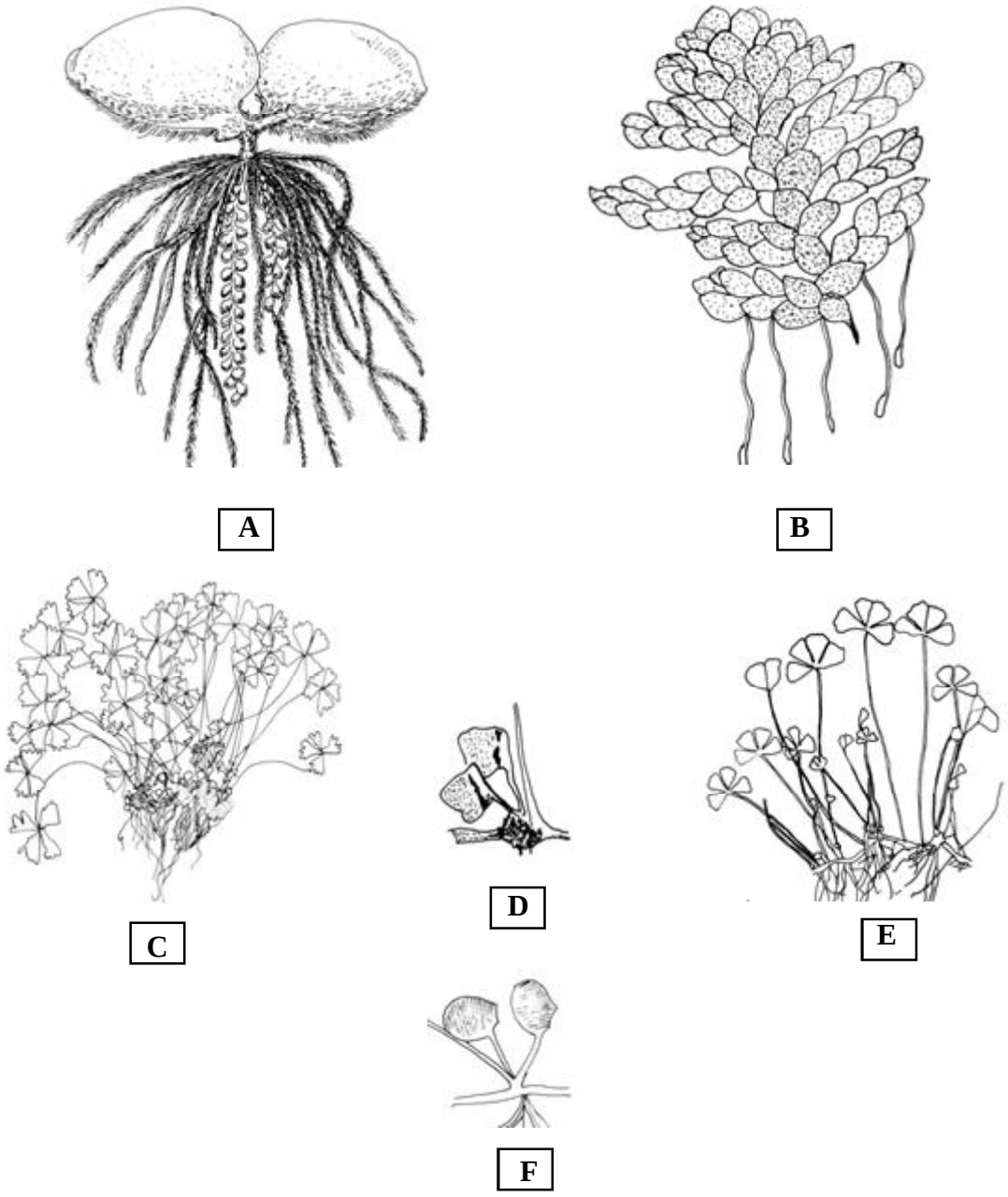

Figure-1
A. *Salvinia auriculata* B. *Azolla pinnata* C. *Marsilea rajasthanensis whole plant*
D. *Marsilea rajasthanensis* Sporocarp E. *Marsilea minuta whole plant*
F. *Marsilea minuta* Sporocarp

Distribution : Uttar Pradesh; China, Tibet, Philippines, Taiwan and Japan.

The west and south area of the district Banswara has long periods of severe drought accompanied by high wind velocity and low relative humidity whereas in the east and north the amount of rainfall and humidity is comparatively high; due to this variation in the climatic condition the distribution of vegetation shows much diversity of aquatic Pteridophytes in this region of Rajasthan. The vegetation in the western and southern regions (Kushalgarh area) is scanty, while in the Eastern and northern regions (Banswara and Peepalkhunt area) much diversity is observed.

The climatic data recorded from the wagad region of Rajasthan reveals that comparatively higher amount of rainfall, higher relative humidity and congenital temperature during the months of July to November in the entire district Banswara, make the overall climate favorable or the growth of moisture loving pteridophyte flora. It is the month of April to June that soil water deficit is noticed in this region. Mostly these pteridophytes thus remain dormant during this hot period perennating through the rhizomes and sporocarps. Furthermore, the presence of perennial, water bodies, dams, barrages and canals in addition of the river like Mahi, Anaas, Som, Kamla and Jakham makes this area very high in relative humidity.

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References :

1. Bhattacharya, M.K.,, A. Nat and A.K. Baishya (1995). *Indian Fern J.12:* 146-158.
2. Bir, S.S. and S.M. Vasudeva (1973). *Plant. Sci. 5:* 71-86.
3. Bir, S.S. and S.C. Verma (1963). *Res. Bull. (NS) Punjab University 14:* 187-202.
4. Bir, S.S., C.K., Satija, S.M. Vasudeva and P. Goyal (1983). Pteriodophytic Flora of Garhwal Himalaya Jugal Kishore and Co., Dehradun (India).
5. Fraser-Jenkins, C.R. (1984). *Bull. Brit. Mus. Nat. Hist. Soc.* (Bot.) *12:* 37-76.
6. Gena, P.L., S. Dixit, K. Rajendra, Sharma and Gena (1995). Pteridophytic flora of Udaipur division, Rajasthan. Abstr. In "National symposium on Researches in Pteridology" held at J.NV. Univ., Jodhpur organized under the auspices of Indian Fern Society (Sec.-I. Taxonomy, Ecology and Distribution): 1-10.
7. Gupta, K. M. and T. N. Bhardwaj (1958). *J. Bombay Nat. Hist. Soc. 55:* 287-292.